

ABSTRACT

A semiconductor optical amplifier (SOA) apparatus and related methods are described. The SOA comprises a signal waveguide for guiding an optical signal along a signal path, and further comprises one or more laser cavities having a gain medium lying

- 5 outside the signal waveguide, the gain medium being sufficiently close to the signal waveguide such that, when the gain medium is pumped with an excitation current, the optical signal traveling down the signal waveguide is amplified by an evanescent coupling effect with the laser cavity. When the gain medium is sufficiently pumped to cause lasing action in the laser cavity, gain-clamped amplification of the optical signal is
- 10 achieved. Additional features relating to segmented laser cavities, separate pumping of laser cavity segments, DFB/DBR gratings, current profiling to improve ASE noise performance, coupled-cavity lasers, avoidance of injection locking effects, manipulation of gain curve peaks, integration with a tunable vertical cavity coupler, integration with a photodetector, integration with an RZ signal modulator, and other described features may
- 15 be used with the evanescent coupling case or with an SOA having a laser cavity gain medium that is coextensive with the gain medium of the signal waveguide.